



US009636928B2

(12) **United States Patent**
Noell

(10) **Patent No.:** **US 9,636,928 B2**

(45) **Date of Patent:** **May 2, 2017**

(54) **APPARATUS FOR THE PRINTING AND RADIATION TREATMENT OF A CURVED SURFACE OF AN OBJECT**

(56) **References Cited**

U.S. PATENT DOCUMENTS

(71) Applicant: **HEIDELBERGER DRUCKMASCHINEN AG**,
Heidelberg (DE)

7,350,890 B2 4/2008 Baird et al.
7,370,955 B2 5/2008 Yokoyama et al.
2003/0234848 A1* 12/2003 Ishikawa B41J 2/2117
347/102

(72) Inventor: **Matthias Noell**, Weiterstadt (DE)

2007/0062383 A1* 3/2007 Gazeau et al. 101/35
2008/0204536 A1* 8/2008 Suzuki B41J 11/002
347/102

(73) Assignee: **Heidelberg Druckmaschinen AG**,
Heidelberg (DE)

2016/0167399 A1* 6/2016 Ohnishi B41J 2/01
347/102

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2 days.

FOREIGN PATENT DOCUMENTS

DE 102009058212 A1 6/2011
DE 102010034780 A1 2/2012

(21) Appl. No.: **14/627,171**

(Continued)

(22) Filed: **Feb. 20, 2015**

Primary Examiner — Kristal Feggins

Assistant Examiner — Kendrick Liu

(65) **Prior Publication Data**

US 2015/0231897 A1 Aug. 20, 2015

(74) *Attorney, Agent, or Firm* — Laurence A. Greenberg;
Werner H. Stemer; Ralph E. Locher

(30) **Foreign Application Priority Data**

Feb. 20, 2014 (DE) 10 2014 002 710

(57) **ABSTRACT**

(51) **Int. Cl.**
B41J 2/01 (2006.01)
B41J 3/407 (2006.01)
B41J 29/12 (2006.01)
B41J 11/00 (2006.01)

An apparatus for the printing and radiation treatment of a curved surface of an object, such as a body part, includes a printing unit, preferably an inkjet print head, a radiation unit, preferably a UV dryer, and a movement unit, preferably a robot, either for moving the printing unit and the radiation unit at a working distance along the surface or for moving the object at a working distance along the printing unit and the radiation unit. A shielding unit can be adjusted and/or deformed relative to the printing unit and/or relative to the radiation unit and during the printing. Scattered radiation is shielded and damage to the printing unit is prevented as a result of the special configuration of the shielding unit.

(52) **U.S. Cl.**
CPC **B41J 11/002** (2013.01); **B41J 2/01** (2013.01); **B41J 3/4073** (2013.01); **B41J 29/12** (2013.01)

(58) **Field of Classification Search**
CPC B41J 2/01; B41J 3/4073; B41J 29/12
See application file for complete search history.

15 Claims, 5 Drawing Sheets

